DCCUMENT RESUME

ED 033 902 SP 003 272

AUTHOR Iange, Carl J.
TITLE Developing Programs fcr Teachers. Prcfessicnal Paper 2C-69.
Pub Date Jun 69
Note 21p.
Available frcm The George Washingtcn University, Human Resources Research Office, 300 North Washington Street, Alexandria, Va. 22314 (Free)

EDRS Price EDRS Price MF-$0.25 HC-$1.15
Descriptors Curriculum Design, *Instructicnal Design, Jcb Analysis, Models, *Prcgram Develcpment, *Systems Analysis, *Teacher Educaticn, Teaching, Training Techniques

Abstract

Utilizaticn of the systems approach to design cf teacher educaticn programs shculd result in greater prcgram effectiveness thrcugh prcvisicn cf frequent opportunity to practice application of knowledge in realistic situaticns. Develcpment of an instructional system might include (1) development of a human factors systems analysis mcdel, (2) develcpment cf jcb models, (3) specificaticn of knowledges and skills required, (4) determinaticn cf instructicnal cbjectives, (5) ccnstruction of the training program, (6) development cf a proficiency test, and (7) evaluaticn cf the training program. Applicaticn of the apprcach tc teacher education design would require analysis of the teacher's jcb in terms of such systems. Research literature on teacher effectiveness and the use of new cbservational systems fcr studying teacher-pupil interacticns can prcvide a base fcr the develcpment of system-jcb models. The trend anticipated is toward greater invclvement of the teacher in dealing with motivaticnal and social influence processes in mcre complex interperscnal interactions with pupils. Curriculum develcpment fcr teacher education must include the creation of instructional cbjectives relevant tc these new roles, and curriculum design must provide practice integrated with theory frcm behavicral science and subject matter content. Such develcpments as minicourses, micrcteaching, interaction analysis, and situation simulaticn can facilitate the integraticn process. (JS)

OCT 2 8 1969

Professional Paper 20-69

June 1969

ED033902

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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Developing Programs for Teachers

by

Carl J. Lange

Published in *Preparing Educators to Meet Emerging Needs*, March 1969

SP003172

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Preparation of this paper was sponsored by "Designing Education for the Future: An Eight-State Project"

Published
June 1969
by
The George Washington University
HUMAN RESOURCES RESEARCH OFFICE
300 North Washington Street
Alexandria, Virginia 22314

Prefatory Note

This paper was prepared for inclusion in *Preparing Educators to Meet Emerging Needs*, the final volume issued in a series published by "Designing Education for the Future: An Eight-State Project." This project has attempted to determine what society might be like in the future, what changes are needed in our schools and educational institutions to prepare for that future, and to examine the planning and change processes whereby these improvements might be brought about. The eight states participating in the project were Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming.

The paper by Dr. Lange, formerly Assistant Director for Planning, Human Resources Research Office, forms Part One of Chapter 5, entitled "Designing Preparation Programs for the Future: Utilizing a Systems Approach." Titles of the other chapters are "Education and Educators in a Changing Society," "Role and Responsibilities of Institutions of Higher Learning," "Emerging Challenges and Designs for the Preparation of Teachers," "Emerging Challenges and Designs for the Preparation of Other Educators," "Challenges for the Future."

This volume has been republished by Citation Press, Scholastic Magazines, Inc., New York City.

CHAPTER 5

Designing Preparation Programs for the Future:
Utilizing A Systems Approach

Part One
Developing Programs for Teachers

CARL J. LANGE *†

Prevalent themes in current discussions of education inevitably include consideration of the unrest and ferment relating to teaching education. There are many facets to the general issue of educating teachers. Some of the problems most frequently discussed are: (1) the need for new roles for teachers in order to make effective use of advances in educational technology and new insights into learning; (2) inadequacy of present-day teachers for work with disadvantaged students; (3) improper use of newly developed curricula by teachers; (4) the need for effective utilization of behavioral science by the teachers in the instructional process; and (5) a tendency for some professional teacher education courses to be trivial, superficial, or irrelevant.

Tradition-bound education programs and a general resistance to considering really new approaches to teacher education are still prevalent. Nevertheless, there does appear to be a growing interest in change—hopefully, improvement—in approaches to teacher education. The increasing momentum of research on teacher education, focusing on teachers' actions in the classroom and on micro-teaching and other simulation techniques, and a widespread and growing recognition of the need to define new roles for teachers as a result of advances in instructional technology are promising signs of movement. It would be an exaggeration to claim a consensus concerning the directions such movements should take or to expect radical changes to occur widely and immediately. Still, the recent move by the Office of Education to fund programmatic efforts to develop specifications for model teacher education programs represents a major new level of effort and may hold potential for extensive change.[1]

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†Appreciation is expressed to Professor James Raths, Director, Bureau of Educational Research and Field Services, University of Maryland, for offering valuable comments on this paper.

[1]Numbers refer to footnote references at end of Part One.

Overview of a Systems Approach to Education

Taken as a whole, the systems approach to education represents an attempt to break the mold of traditional instructional concepts and to approach instruction from an open, innovative, and product-oriented perspective. In evaluating the status of available knowledge, the systems orientation pays attention to how what is known might be used and to what new knowledge is needed to develop useful products.

Training Research and Education

In 1962, Glaser,[2] Director of the Learning Research and Development Center at the University of Pittsburgh, edited a book, *Training Research and Education,* designed "to provide an account of representative research and thinking that has gone on in the context of training research and to examine the implications for education in general." Preparation of that volume was stimulated by recognition of the relevance, to civilian education, of research and development in problems of military training and the underlying phenomena of learning.

The chapters in the Glaser compilation are organized around a general conception of an instructional system that includes the following components: (1) instructional goals—the system objectives; (2) entering behavior—the system input; (3) instructional procedures—the system operator; (4) performance assessment—the output monitor; and (5) research and development logistics. The first four of these components represent phases of the main flow of the instructional system. The last component is the research and development endeavor from which results feed into all phases of the instructional system. The research and development efforts are oriented toward constructing and/or improving the system and toward producing results that can be put to practical use.

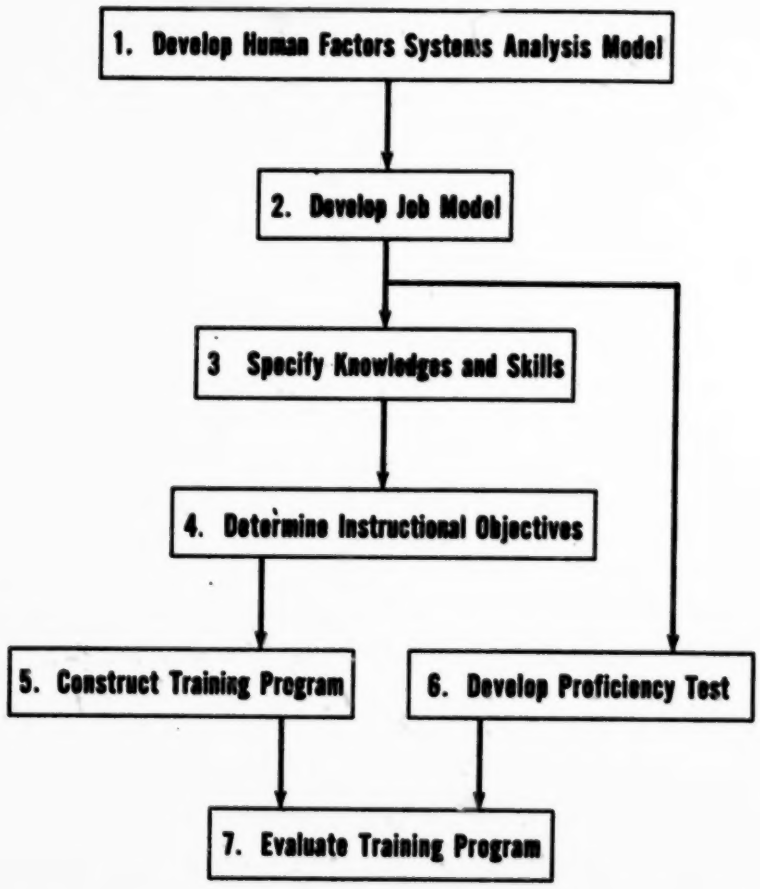
General Steps in the Systems Approach

A number of quite similar paradigms representing the principal activities required in the development of instructional systems have evolved from research and development on training.[3] Borrowing from one of these paradigms[4] and modifying it slightly produces a sequence of the activities for the purposes of this discussion (See Figure 1).

This formulation of "seven steps" is intended as a very general outline of activities to be undertaken in the process of developing an instructional system. It places considerable emphasis on *making the instruction relevant* to preparing the student for effective performance of a job in a formal organization.[5] The activities to be performed may be characterized by the headings and brief explanations which follow:

Systems Analysis. Since the approach has most frequently been applied in preparing students for performance in complex man-machine systems, the first step is described as a systems analysis performed from

Figure 1: *Principal Activities in the Development of an Instructional System*


1. Develop Human Factors Systems Analysis Model
2. Develop Job Model
3 Specify Knowledges and Skills
4. Determine Instructional Objectives
5. Construct Training Program
6. Develop Proficiency Test
7. Evaluate Training Program

a psychologist's point of view. This analysis involves study of the functions to be performed by each component in the system, *with primary interest in the functions of the human components and their interactions with other components in the system as required to achieve system goals.* The information so derived is the basis for job allocation and specification. In addition to providing information as to knowledges and skills that need to be acquired in formal instruction, the systems analysis also provides information relevant to selection of personnel, and to human engineering of hardware components. Such analysis can be applied to the design of both new and existing systems and organizations. When it is applied to existing organizations, the results may have implications for change in the allocation of functions—for example, breakout of additional job positions and consolidation or even elimination of job positions.

Job Analysis. The second step involves analysis of the specific job to determine major job duties and specific job tasks for each job duty, and to develop detailed task descriptions for each task. A variety of procedures may be used for analysis of the job, and information is ordinarily obtained from a number of sources.

Knowledges and Skills. The knowledge and skill components are specified for each of the tasks in the third step, which is behavioral ana-

lytic. It deals with processes that are psychological in nature, such as sensing, discriminating, remembering, deciding, choosing, and responding.

Objectives of Training. The fourth step involves the development and precise statement of the objectives of the instructional program, based on the knowledge and skill specification. Objectives are arranged in a hierarchy with terminal objectives and sequential enabling objectives. *Terminal objectives describe student action at the level of a meaningful unit of performance.* Enabling objectives consist of component actions, knowledges, and skills the student must learn in order to attain the terminal objectives. Criteria for selecting of objectives usually include entering repertoires of students (i.e., their knowledges and skills before beginning the course) and appropriateness of the item to be learned for immediate schooling as compared with later on-the-job training.

Training Program. Selection of subject matter, programming of content, design or selection of media, development of in-course achievement measures, and specification of motivational techniques make up the fifth step.

Proficiency Testing. The sixth step is the development of end-of-training proficiency tests based on the terminal objectives. Tests are designed to measure the student's ability to perform the task according to standards specified in objectives.

Program Evaluation. The seventh, and final step, is the evaluation of the training program, preferably in terms of how well graduates of the course meet proficiency standards and at what instructional cost.

Some Advantages of This Approach

The significant contribution of such an approach is that *it provides for systematic steps to make instructional systems relevant to the purposes for which they exist, and for the possibility of systematic feedback of information to assure continued relevancy.*

In the application of this seven-step approach, a variety of techniques are used in performing the activities required, and there may be considerable movement back and forth between the main blocks of activities in the process of developing an instructional system. In all of the steps, relevant basic and applied research results are utilized in the development of specific systems. While there is a growing body of workable techniques and methods, there is also continuing need for research on methodology, directed toward creating or improving techniques and procedures for performing the various activities.

Lest the reader be dismayed because this general approach appears to be mechanistic and lacking in "human" values, let me emphasize that such an approach has been applied, with useful results, to the study of such complex "human" aspects of jobs as interpersonal relationships,

problem solving, and decision making.[6] The teacher's job is complex, but experience in analysis of similarly complex jobs suggests that the job can be broken down and be usefully analyzed.

Application to Teacher Education

What are the aspects of teacher education that can most appropriately be served through application of this general systems approach? Smith,[7] in a report on a study supported by the Fund for the Advancement of Education, describes five areas which a group of educators involved in teacher education projects agreed upon as being essential to the process of teacher preparation: (1) a liberal education; (2) specialized knowledge of the subject to be taught; (3) professional knowledge, including understanding of the role of the school and contributions of the behavioral sciences; (4) practice under adequate supervision; and (5) unifying theory. Generally, the systems approach is most applicable to items (2), (3), (4) and possibly (5), the areas most directly involved in the actual process of teaching.

Expected Gains from the Systems Approach

A number of important gains would accrue from applying the systems approach to the development of teacher education programs. First of all, the relevance of programs would be increased by providing instruction known to be related to critical knowledges and skills. This approach could improve performance of teachers in more traditional educational systems. Even more clearly, *in new instructional systems that require new roles,* such relevance is essential to removing a potent set of obstacles to success.

Further, the more efficient use of learning resources and time in teacher education programs should result in development of greater professional skill and should provide needed time for pursuing liberal education in greater depth. The approach also encourages greater participation of school systems, including teachers, in the design and updating of teacher education programs. Making provision for obtaining evaluative information would provide a basis for quality control of programs to insure that minimum standards, at least, are being maintained. Feedback of information on the performance and experiences of graduates could be used to make modifications needed to meet changing requirements, and to correct deficiencies or excesses in existing programs.

The remainder of this paper is devoted to a discussion of the application of the systems approach to the development of teacher education programs, including some current trends in research on teacher education and effectiveness as reflected in the literature. The discussion will be oriented more toward general points of interest than to detailed technical considerations.

As a general observation, the scope of effort and the types of re-

sources required to broadly apply a systems approach to the development of entire pre-service programs are very substantial. *Such an approach will require coordinated efforts from the research community, schools of education, and public school systems.*

Analysis of the Teacher's Job

If the concept of designing instructional systems to meet specified educational objectives is taken seriously—and there is ample evidence that it is—the role of the teacher should be analyzed in terms of such systems.

The Teacher's Role in Instructional Systems

Looking to the future, it is conceivable that the concept of "teacher" may be altered, with the development of more definitive positions being required by the operation of instructional systems and by their design and management. Some of these positions may be highly specialized. For example, three major types of jobs are generally seen as needed: (1) the system designer, (2) the system manager, and (3) human components in the instructional system. These several roles vary considerably in terms of the qualifications required.

In educational systems of the future, decisions about job positions should be based on appropriate systems analyses as to how job duties are allocated to the personnel subsystem. One might envision a career progression in education which would involve initial job experience at a lower echelon in the system, return for formal schooling, and progressive movement to higher level jobs in a much more complex fashion than is presently the case for transition from teacher to instructional leader or administrator. To be sure, such change is likely to be evolutionary rather than revolutionary, but *the job of the teacher can no longer be seen as static and unchanging* if improved educational technology, the changing needs of society, and needs of individuals are to have their fullest possible impact.

In the more immediate future, one can expect continuing efforts directed both at improving the teacher in the more traditional classroom role in direct interaction with students, and at developing new roles for teachers in the use of innovations from educational technology. Joyce states that:

> The 1950's and 1960's have been a time when the conception of staffing the schools with only one kind of person (the multipurpose classroom teacher) and only one kind of material (textbooks and trade books) has been replaced with the view of the school as a complex of man-machine systems in which teachers of many kinds work with technicians and lower order personnel of many qualities and in a matrix of technological devices and instructional resource centers.[8]

He further notes that:

> Innovations such as team teaching or programmed instruction often appear in local setting without the development of a full-scale pattern of organization that can enable these changes to be made or studied effectively. When in-

> troduction of a staff utilization pattern is conceived as the construction of a man-machine system, however, careful analysis of the possible behavior of the machine and people can be made in an effort to find out the actual situation of staff utilization of roles that teachers take on easily and the kind which they resist.

Gage and Unruh describe the revolutionary force of programmed instruction, broadly defined, in education and state that:

> If successful, it will overthrow the hegemony of the centuries-old pattern whereby one teacher and 20 to 40 pupils engage for most kinds of instruction in a teacher-dominated discourse.[9]

Perhaps the most likely prediction for the future is that the teacher will play a greater multiplicity of roles than in the past. The conventional role of the teacher is being studied intensively by those using interaction analysis techniques, which involve observation of the teacher performing in the classroom setting.[10] There appears to be a growing consensus that a critical area for future work is the careful analysis of the tasks to be performed by teachers in systems using such innovations as nongraded classrooms, programmed instruction, closed circuit television instruction (CCTV), and computer-assisted instruction. Analysis is also needed for older innovations such as team teaching. In addition, analyses are needed on those aspects of the teacher's job that are not directly involved in the instructional process—for example, the teacher's roles in staff utilization, broadly defined to include interacting with teacher aides, school psychologists, guidance counselors, health specialists, etc. Also assuming increasing importance is the role of interacting with parents.

Development of Composite Job Models

Since the teacher will need to fulfill a multiplicity of roles, especially to accommodate innovations from education technology, it would seem essential to develop composite job models which, in effect, represent idealized jobs. As Cogan[11] states in a discussion of Systems-Analytic Training Programs, "The system-job model is a translation of the varieties of operational realities, with their vicissitudes, into an idealized symbolic analog."

In developing an idealized job-model, wise decisions need to be made about what is to be included. Subjective judgment needs to be exercised in creating the model. However, to the greatest extent possible, the model should have an empirical base as well as a conceptual framework. Among the sources that are of demonstrated value in creating models are observations of job activities (supplemented by structured interviews, questionnaires, or daily logs kept by job incumbents), research literature relating to studies of job (teacher) effectiveness and to aspects of human performance related to those required on the job, and simulations of systems in which the job is a component.

One important distinction to be made among the sources is between information related to analysis of job incumbents and the information obtained from invention and design of new types of activities. Obviously,

in analyzing the activities required in innovative systems, the development of job information requires invention. But since armchair analysis cannot forsee all elements of how a system will function, some empirical tryout is needed. Simulation can be useful for this, but it would be most desirable to conduct tryouts of the new system in an operational setting to get a full appreciation of job performance requirements and their administrative and fiscal implications.

Such a need is recognized by Joyce:

> . . . the first few years of a new utilization pattern should probably be given to engineering research that can result in knowledge of the optimal dynamics of the utiiization pattern.[12]

Joyce implies that inventors of new systems must include effort devoted to careful analysis of the human components in the system, and that such analysis should pertain to developing job-descriptive information necessary for training the human components. He also implies that a cooperative effort involving research and development teams, school of education staff, and public education staff is a necessity.

Current Research Emphasis on Teacher Effectiveness

A comprehensive body of research literature on teacher effectiveness exists and is growing rapidly. In the past 10 years, the emphasis in such research has turned from studies relating teacher characteristics to pupil performance and attitudes to studies of teacher and student behaviors in interaction episodes. As Biddle pointed out in 1964:

> We are, in a sense, at the same crossroads faced by leadership in research two decades ago. Prior to 1940, much conflicting evidence had been gathered on traits and 'behaviors' of leaders. About 1940, responsible investigators began to emphasize the contextual necessities of leadership, particularly those demands that were placed upon the leader by the needs of the followers and the organization in which leadership was exerted.[13]

The comparison to leadership research is a provocative one. The recognition of the desirability of studying the leader, the follower, and the situational context was a key element in making leadership research responsive to producing information useful for developing leadership training.

In a program of research by Lange and associates,[14] descriptions of acts by leaders when interacting with followers in job-related situations were obtained, codified according to a set of categories, and related to criteria of effectiveness. The results, together with findings from experimental studies of leadership in small groups and from other social influence literature, provided the basis for development of a model of the functional role of the leader in small groups. A training program was then developed, using simulations of leader-follower interactions and small group discussions to teach perceptual and analytic skills needed to identify important factors in leadership situations, place these in an order of importance, and select an appropriate course of action.

Studies of Teacher-Pupil Interaction

Several observation systems for conducting objective studies of teacher-pupil interactions have been developed. Flanders'[15] interaction analysis system, one of the best-known examples, includes ten categories in matrix form: (1) clarify feeling constructively; (2) praise or encourage; (3) clarify, develop or make use of ideas suggested by students; (4) ask questions; (5) lecture; (6) give directions; (7) criticize; (8) student talk in response to teacher; (9) student talk initiated by the student; and (10) silence or confusion. This technique for observing teacher behavior, as well as other similar techniques, is being used to study teacher activity in the classroom as it relates to pupil learning and attitudes.

In general, the body of research on observation of classroom activities should provide an increasingly richer store of data concerning teacher effectiveness. However, one can observe that the orientation of most of these studies is that of the scientist interested in understanding the phenomena of the teacher in the classroom. Investigation tends to stop with analysis and interpretation of findings. What appears to be needed are more studies from the approach of technology, with an orientation of synthesis to develop models of the teaching process that can be used to construct educational programs. It is recognized that interaction analysis has been used as a technique for training teachers and has been effective in changing teaching behaviors. However, the present point of emphasis is that studies oriented toward detailed analysis, synthesis, and modeling of the teacher's role are needed to translate educational research results into integrated educational programs. Such efforts should pay particular attention to teacher behavior as it relates to achievement of specific types of objectives by students.

These studies are representative of a movement to study the effects of teacher behavior in the classroom on student performance and attitudes under varying contextual conditions. They are relevant to the more traditional role of the teacher. The general trend of results from these studies appears to emphasize the importance of teacher flexibility—flexibility in being sensitive to needs of the student, to the demands of the subject matter being taught, and to acting in response to the student's needs. For example, the work reported by Flanders[16] suggests that the more effective teachers are characterized by indirect behaviors, that is, behaviors which reflect students' feelings and elicit response from them, and react appropriately with reinforcement (praise) related to students' specific performance. The less effective teachers spend more time giving information (lectures) and are more frequently critical. More recent results suggest a curvilinear relationship with indirect teacher behavior, suggesting that some structuring behavior by the teacher is desirable.[17]

This general trend of results implies that *the teacher needs perceptual analytic skills in appraising student actions and attitudes, as well as skill in questioning, recognizing students' feelings, and giving praise.*

Anticipated Changes in the Role of the Teacher

One of the main trends in educational technology is to develop components of the instructional system that will in part replace the function of the teacher in carrying on the instructional process. For example, programmed instruction and the computer will be used to present information, ask questions, and respond to students' behaviors.[18] The general objectives of such innovations are to individualize instruction to accommodate differential student aptitudes and interests, and to increase student participation in the learning process.

In these circumstances, the role of the teacher will change to an emphasis on diagnosis of pupils' strengths and weaknesses, prescription of instructional tasks, individual assistance to students, and guidance. In addition to these practices, which will place greater demands on teachers, there should be an increased use of small group discussions and of games and simulations, all of which will require interpersonal skills and understanding of social processes.

The requirement for individuals in an increasingly complex society to participate effectively in groups engaged in problem solving, decision making, and negotiating represents a significant need that should be met by education. Providing educational experiences relevant to this need might well represent as significant a trend for the future teacher as the shift to manager of instructional systems. Preparing the description and analysis to create the job activities required to carry out these new roles presents one of the important challenges to educational research and development in the future.

Designing Teacher Education Programs

If teacher education programs are to be relevant for preparing teachers in the knowledges and skills as described and analyzed in job models, considerable emphasis will need to be given to the practice of skills in the curriculum. The instructional objectives derived from the knowledges and skills required for job performance frequently will be stated in terms of skills that are needed. The increased emphasis on skills that would follow from a systems approach to developing programs for teachers is consistent with current interest in micro-teaching, mini-courses, interaction analysis as a teaching tool, and simulation.

However, as stated earlier, the creation of new teacher roles required to accommodate innovations from educational technology will represent additional objectives to be met by teacher education programs. Thus, *an important step in curriculum development of teacher education programs to meet future needs will be the creation of instructional objectives relevant to these new roles*. The creation of such objectives presupposes the formulation of the necessary job model which describes and analyzes the job functions and related knowledges and skills.

Sequencing Objectives

The systems approach which has provided the basis for this discussion of teacher education programs has been utilized in the development of courses of instruction. For purposes of the discussion in this section, a distinction can be made between curriculum development and course development. The word "curriculum' is defined as meaning either a single course or, collectively, all of the courses of study in an educational program.

Traditionally, individual courses are administered under the purview of a single teacher or faculty member who has considerable latitude in shaping the course. A key feature of the utilization of a systems approach to the design of educational programs is the sequencing and integration of specific enabling objectives to achieve efficiently the terminal objectives of the program. To accomplish desirable sequencing and progressive integration, more coordination in establishing specific objectives for individual courses would seem essential. For optimum individualization of instruction and integration of objectives, departure from the course concept to training modules probably would be desirable.

Integrating Objectives to Emphasize Practice of Performance

Some general observations can be made concerning sequencing objectives which are consistent with the orientation of making teacher education relevant.

The first is that *practice of performance should be introduced as early as possible in the curriculum and opportunity for practice of performance should be integrated into the curriculum insofar as possible.* Micro-teaching,[19] interaction analysis, and other simulated approaches[20] could be utilized to provide such practice.

A second point is that *concepts from such fields as psychology and sociology should be integrated into the curriculum as they relate to aspects of the teacher's performance.* This notion would not preclude study of such fields under liberal arts as part of general education. It does, however, assume that in professional courses *the translation of general concepts to teacher performance should not be left to the student* but rather should be integrated as appropriate in the job-relevant part of teacher education.

The third point is that in the subject matter part of teacher education, *emphasis should be placed on content that is required for teaching the subject and integrating instructional techniques and practice in the subject matter courses.*

These observations all are directed toward increasing the relevance of teacher education programs by providing maximum opportunity to practice performance required on the job. Performance is broadly defined

and includes interpersonal skills, decision making, problem solving, and planning responsibilities. Provision should be made throughout the program for immediate feedback on performance in practice situations.

Advantages of Integrating Theory with Practice

Integrating theoretical concepts with the learning of job-related performances should have several beneficial effects. *The tendency to deal with words abstracted from events to the point of bare formalism can be avoided.* Critical factors are less likely to be obscured by being imbedded in a context of high-sounding symbols linked by artificial relationships, with no tie-in to empirical reality.

In practice, *principles must always be applied to specific situations.* The application must involve considering situational variables, including context variables which represent previous interaction experiences of those involved. The awareness and judgmental weighting of such variables influence the selection of a course of action.

It may be relatively easy to formulate, discuss, and reiterate general principles. The difficult part is to apply principles without becoming stereotyped. It is practice in dealing with specific situations that prevents the learning of stereotyped solutions to problem situations.

Systems-Designed Programs for Professional Ends

In order to introduce changes in teacher education, it is likely that programs of instruction must be developed to achieve a specific set of objectives derived from analysis of the job. Such "packages" are commonly objected to as being "teacher proof" and as usurping the role of the instructor; also, the emphasis on the practice of job-related performance is frequently perceived as craft oriented—a trend toward mere technician training and away from professional development.[21] These criticisms can be rejected as not applicable if programs of instruction are developed to provide adequate practice of performance in the full range of knowledge and skills required.

Such programs will place greater demands on the instructor to serve as a resource person and to react in a much less structured situation than in the usual classroom lecture approach. *The student along with the instructor will be faced repeatedly with the challenge of applying concepts of education to significant problems of today.* Such a move to practice in applying concepts may produce a less serene atmosphere than detached academic contemplation, but the student's experiences should be more vital and certainly no less professional than detached analysis.

Selected Examples of Recent Developments

At this point a brief look at some examples of recent developments

in teacher education and related fields should be useful for providing illustrations of some of the concepts that have been discussed.

Mini-courses and Micro-teaching

The Far West Laboratory for Educational Research and Development has developed a mini-course, "Effective Questioning in a Classroom Discussion".[22] The mini-course is similar to micro-teaching in that both techniques require the teacher to prepare a scaled down lesson, which is videotaped and critiqued. The lesson plan is modified on the basis of the videotape observations and is then retaught, with the second presentation also being taped and critiqued. Success is defined in terms of behavioral change rather than recitation of content. The emphasis is thus on the learning of skills which can be clearly defined and demonstrated, and change is effected through observations of models, practice under non-threatening conditions, and relatively quick behavioral feedback by means of videotape recordings.

The instructional sequences deal with specific types of behaviors, beginning with techniques for increasing student participation (e.g., using "pausing" behavior to provide a discussion atmosphere and time for students to organize complete answers), and proceeding to uses of questions for eliciting more complex responses reflecting higher order thinking. Questioning techniques that involve probing, prompting, and refocusing are learned—and all are directed toward obtaining active and thoughtful participation by students.

Interestingly, during field testing, teachers expressed curiosity about why various behaviors were included in the course and about theories and research evidence related to the course. In response to the expressed interest, a "handbook" was prepared to provide a well-documented, scholarly treatment of research and theory relevant to the course.

This work provides an excellent example of the development of training oriented to the learning of practical skills of great importance in the classroom. The course is based on aspects of job performance and utilizes relevant research and theory from psychology both in its development and in the handbook. It provides for practice with rapid feedback. The handbook reports that preliminary analysis of samples of teaching behavior taped before and after training yielded evidence of dramatic changes.

This course was designed for in-service teaching. Similar uses of micro-teaching preceded the development of this course. *Integration of this type of training in subject matter courses for teachers during pre-service training would seem to be especially valuable in providing practice of the skills and in producing an acute awareness of the knowledge needed to frame questions to elicit higher order responses.*

Interaction Analysis

Interaction analysis has been studied as a technique for providing feedback to teachers in training designed to shape verbal teaching behavior. For example, Hough[23] describes a study in which interaction analysis used as an aid in conceptualizing, analyzing, and obtaining feedback to verbal teaching behavior was compared with training which did not use interaction analysis. The training in both courses emphasized practice of patterns of questioning, praising, encouraging, clarifying, giving corrective feedback, and soliciting various types of student responses in simulated micro-teaching episodes. The use of interaction analyses by the student teachers as an aid to conceptualizing desired behavior, and to analyzing their behavior in reference to such conceptualization as they practice, provides a self-reinforcing mechanism. In the study, change in behavior, in the direction of more praise and encouragement of students and more frequent acceptance and clarification of students' ideas, was found to be greater for those who used the interaction analysis technique.

These approaches—micro-teaching, interaction analysis, and mini-courses—all are oriented toward the instructional process in the classroom where there is continuous interaction between the student and the teacher. Generally, the future is likely to feature the teacher interacting with the student in respect to larger "chunks" of activity, as, for example, in Individually Prescribed Instruction where the cycle is diagnosis, prescription, evaluation, and further prescription along with individual assistance to students and guidance.[24] Current emphasis in teacher training toward teacher behavior that elicits participation from the student should make this shift in role more gradual than if it were from the more traditional classroom lecturer role.

Leadership Training

Some research in the leadership training area would seem relevant to the role of the teacher.[25] This relevance is most likely to be in managing activities of students engaged in individual learning using programmed instruction, computer-assisted instruction, or even self-study with conventional textbooks. Here the similarities between the leader and the teacher lie in the more intermittent interactions (as opposed to continuous interactions) involved in assigning work and reacting to work in process and completed work.

In the program of research on leadership,[26] descriptions of leader actions in certain situations—such as job assigning or planning, job in process and being done well/poorly, job completed and done well/poorly—were collected and content analyzed. These situations are similar to those in which the teacher must manage instructional activities when interacting with students. Some examples of behaviors which characterized effective leaders are: (1) giving information that facilitates performance; (2) clarity of oral communication; (3) rewarding and punishing con-

sistently on the basis of performance; (4) not reacting emotionally to poor performance; (5) checking reasons for failure.

The findings resulted in a formulation of the functional role of the leader. A program of instruction was developed to teach the functional role with the objective of producing actual increases in the leadership skills of students. The course was built around small-group discussions of situations involving realistic leadership problems. The situations were tape recordings of representative problems. A textbook on the functional role provided a meaningful framework of theoretical concepts for studying the leadership problems presented in the practical exercises. Thus, the course integrated theoretical concepts with practice in dealing with social influence processes in learning and performance situations.

Such an approach to development of training programs for teachers in the new roles required by innovations from educational technology—roles that will require greater skill and insight in motivational processes and social influence processes—would appear to be necessary. The study of the teacher's role in this context should emphasize the kinds of information that will be available concerning student performance, and the perceptions and judgments required for analysis and diagnosis, as well as skills in interacting with the student. Thus, it would seem that simulation would need to depict appropriate samples of student activity so that the teacher can get practice in perceptual and analytic skills.

Subculture Simulation

A final example of research that has implications for teacher training comes from research on training for advisors to serve in foreign countries.[27] Traditionally, training programs for advisors have emphasized such desirable components of individual performance as technical knowledge, knowledge of the country, and language skills. Interpersonal capabilities required for effective interaction have not been emphasized. In a current research program, a technique has been developed to simulate, in a live role-playing encounter, psychologically and culturally significant interpersonal aspects of the overseas situation.

The interesting aspect of this work is that American cultural patterns were analyzed in terms of the problems American officials typically encounter overseas, and codified along dimensions according to a modification of a schema by Kluckhohn and Strodbeck.[28] These dimensions were extended to derive contrast-to-American configurations representing mirror images of pertinent aspects of American culture. A series of plausible overseas advisory situations was developed to elicit spontaneous culturally-derived behavior from American trainees. These situations used role-playing auxiliaries who were trained to reflect the contrast-to-American values and assumptions, that is, values and assumptions different from American values and assumptions. The simulation provided an emotionally involving confrontation between the American and the contrast-to-American.

The potential of such an approach to developing simulation situations for training of teachers from one subculture to interact effectively with students from another subculture suggests a fruitful direction for future research and development in teacher training. Note that it involves an insightful analysis of the system in which the individual is working, modeling of selected cultural aspects of the system, and development of training to provide realistic practice with feedback on performance in a supporting situation.

In Summary

A systems approach to development of training programs has been described, and the utilization of the systems approach in the design of teacher education programs has been discussed. Particular attention was given to the importance of the systems approach in providing training programs that are relevant to the teacher's roles. Long-term and short-term future trends were discussed in reference to work on job models for the teacher. Considerations of curriculum design which provide practice integrated with theory from behavioral science and subject matter content were presented. Examples of research and development on teacher training and related training problems were briefly described to suggest current and future trends and to provide illustrations of some of the concepts noted.

In general, *the utilization of the systems approach in the design of teacher education programs should result in enrichment of the educational experiences of teachers by providing them with frequent opportunity to practice application of knowledge in realistic situations.* Their experiences should be livelier and more meaningful than is the case when practical work is a remote goal in the future. Further, the trend anticipated with educational innovations is toward greater involvement of the teacher in dealing with motivational and social influence processes in more complex interpersonal interactions with students, as required in individualized instruction, games and simulation, small group discussions, and teacher-student planning.

Footnote References

1. See *School and Society*, 96 (2308), (1968), p. 266.
2. Robert Glaser, ed., *Training Research and Education* (Pittsburgh, Pa.: University of Pittsburgh Press, 1962), p. 5.
3. For example, see Meredith P. Crawford, "Concepts of Training." Chapter 9 in *Psychological Principles in System Development.* Robert M. Gagne, ed., (New York: Holt, Rinehart and Winston, 1962); also, Eugene A. Cogan, *The Evaluation of Systems-Analytic Training Programs* (Alexandria, Va.: Human Resources Research Office Professional Paper 29-67, June 1967).
4. Crawford, *op. cit.*
5. See the following reports from the Human Resources Research Office, Alexandria, Va., for discussions of detailed concepts and procedures relating to this seven-step approach:

Robert G. Smith, Jr., *The Development of Training Objectives* (Research Bulletin 11, June 1964);
Harry L. Ammerman and William H. Melching, *The Derivation, Analysis, and Classification of Instructional Objectives* (Technical Report 66-4, May 1966);
Robert G. Smith, Jr., *The Design of Instructional Systems* (Technical Report 66-18, November 1966);
Robert G. Smith, Jr., *Controlling the Quality of Training* (Technical Report 65-6, June 1965).

6. For example, see Carl J. Lange, Vincent Campbell, Robert Katter, and Fred Shanley, *A Study of Leadership in Army Infantry Platoons* (Alexandria, Va.: Human Resources Research Office Research Report 1, November 1958), and Harry L. Ammerman, *A Model of Junior Officer Jobs for Use in Developing Task Inventories* (Alexandria, Va.: Human Resources Research Office Technical Report 65-10, November 1965).
7. Elmer R. Smith, ed., *Teacher Education: A Reappraisal* (New York: Harper and Row, 1962), p. 213.
8. Bruce K. Joyce, "Staff Utilization," *Review of Educational Research,* Vol. 37, No. 3 (1967), pp. 323-336.
9. N. L. Gage and W. R. Unruh, "Theoretical Formulations for Research and Teaching," *Review of Educational Research,* Vol. 37, No. 3 (1967), pp. 358-370.
10. For a recent review, see: Bruce J. Biddle, "Methods and Concepts in Classroom Research," Chapter X in *Review of Educational Research*, Vol. 37, No. 3 (June 1967).
11. Cogan, *op. cit.*
12. Joyce, *op. cit.*
13. Bruce J. Biddle, "The Integration of Teacher Effectiveness Research," in *Contemporary Research on Teacher Effectiveness,* Bruce J. Biddle and William J. Ellena, eds., (New York: Holt, Rinehart and Winston) (1964) p. 38.
14. Carl J. Lange, *Leadership in Small Military Units: Some Research Findings* (Alexandria, Va.: Human Resources Research Office Professional Paper 24-67, June 1967).
15. Ned A. Flanders, "Some Relationships Among Teacher Influence, Pupil Attitudes, and Achievement," in *Contemporary Research on Teacher Effectiveness.* Bruce J. Biddle and William J. Ellena, eds., (New York: Holt, Rinehart and Winston, 1964).
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17. Robert S. Soar, *An Integrative Approach to Classroom Learning* (Philadelphia: Temple University, 1966).
18. See Gage and Unruh, *op. cit.*, for a discussion of programmed instruction, broadly defined, and implications for theoretical formulations concerning teaching.
19. Dwight W. Allen, "Micro-Teaching: A New Framework for In-Service Education," *The High School Journal,* Vol. 49, No. 8. (May 1966).
20. See B. Y. Kersh, "Classroom Simulation: *Further Studies on Dimensions of Realism,*" (ED 010, 176, Teaching Research Division, Oregon State System of Higher Education, Monmouth, Oregon, December 1965), and Paul A. Twelker, "Classroom Simulation and Teacher Preparation," *The School Review,* Vol. 75, No. 2 (Summer 1967).
21. See, for example, pp. 228-229 in W. O. Stanley, "The Social Foundation Subjects in the Professional Education of Teachers," *Educational Theory,* Vol. 18, No. 3 (1968).
22. *Effective Questioning in a Classroom Discussion,* Teacher Handbook, Minicourse One, (Far West Laboratory for Educational Research and Development, January 1968).
23. John B. Hough, "Training in the Control of Verbal Teaching Behavior Theory and Implications," paper for American Educational Research Association (Session 155), New York, 1967.

24. As, for example, in Individually Prescribed Instruction. See p. 7 in *Individually Prescribed Instruction, Education U.S.A. Special Report* (Washington, D. C. 1968).
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26. *Ibid.*
27. Edward C. Stewart, *The Simulation of Cross-Cultural Communication* (Alexandria, Va.: Human Resources Research Office Professional Paper 50-67, December 1967).
28. Kluckhohn, Florence R. and Strodtbeck, Fred L., *Variations in Value Orientations* (Evanston, Ill.: Row, Peterson and Company, 1961).

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